Workplace Safety

How OSHA Guardrail Requirements Protect Against the Leading Edge for Falls

Gillian Scott and Don Sears | Dec 20, 2018

Falls are an ongoing workplace safety issue, and violations of general fall protection requirements regularly land at the top of OSHA's annual Top 10 list of most-frequently cited standards. Though falls can occur nearly anywhere—including on flat surfaces—a subsection of falls requires specific safety rules and special equipment. That subsection is for falls from a leading edge.

When the Occupational Safety and Health Administration's final rule on fall protection went into effect in 2017, among the updates was a clarification on when ***fall protection systems*** are needed around leading edges: If there is 6 feet or less from the leading edge, a conventional fall protection system (such as a guardrail system, a personal fall arrest system or a safety net) must be used, says ***Leading Edge Safety***. If the distance is between 6 and 15 feet from a leading edge, a designated area for temporary work is required, with a warning line that must be placed at 6 feet. But what's a leading edge?

What's a Leading Edge?

In the Safety and Health Regulations for Construction, ***CFR 1926 Subpart R***, OSHA defines a leading edge as "the unprotected side and edge of a floor, roof, or formwork for a floor or other walking/working surface (such as deck) which changes location as additional floor, roof, decking or formwork sections are placed, formed or constructed."

The standard ***A10.32-2012*** by the American National Standards Institute similarly defines a leading edge as "the unprotected side or edge during periods when it is actively or continuously under construction."

"OSHA has their own definition, but from my experience and what I have seen out in the field, a leading edge application would be anytime there is potential for the connecting device to come in contact with an edge—be it a lifeline, a self-retracting lifeline or a lanyard, it's 'leading edge' to me," says Leah Shook, product marketing manager at Honeywell Safety Products in an interview with Better MRO. But there are other potentially dangerous nuances between the OSHA definition and what is experienced in the real world.

"It can also be where you are tying off below a D-ring, and you do not have an overhead anchor point, so you have to tie off at foot level," she says. "I would say 90 percent of the time there is the potential

for that lifeline to come in contact with an edge."

Shook says that it does not happen every single time, but there is a very high probability of issues with the leading edge when not using correctly rated lifelines and connecting devices. Many of the products that are rated for the leading edge in fall protection are made to adhere to ANSI standards, as they are more precise in their safety specifications. OSHA will often look to see if companies are using ANSI's leading edge standards for PPE, and customers will often request that the products companies use comply with ANSI, says Shook.

Need a better understanding of the different standards? Read "OSHA Vs. ANSI: How to Up Your Safety Compliance Game."

Sharp Edges Are Also a Hazard

While leading edges pose a fall hazard, sharp edges can compromise an inadequate fall protection system. That's because if a worker falls and their lifeline is pulled tight by the worker's weight over the sharp edge of a beam, piece of flooring or other material, a lifeline made for general fall protection runs a higher risk of being severed.

"A sharp edge is one that, for practical purposes, is not rounded and has the potential to cut most types of lifelines," ***says Craig Firl at Capital Safety***, now part of ***3M Fall Protection***. "The ANSI standard for sharp edges, for example, involves testing the fall arrest device's lifeline over a piece of steel bar with a radius of no more than 0.005" (5 one thousands of an inch). If the lifeline is cut or severely damaged, the device fails the test and does not comply with ANSI."

Leading Edge Risks in Construction and General Industry

The CPWR-***Center for Construction Research and Training*** says leading edges have special risks because fall protection methods such as guardrails, safety nets and horizontal lifelines are often impractical. The center reports that 25 ironworkers died between 2000 and 2009 while installing decking after falling off the unprotected side of a work zone's leading edge.

While much of the application for leading edge is for construction environments, there are still many applications in general industry. Think of all the environments where an overhead anchor point is not available: in maintenance work with scaffolding or on the roof, explains Shook.

"In general industry, it's common for maintenance employees to service equipment that is located on a roof. In many cases, these roofs do not have railings or parapet walls that comply with fall protection regulations," ***says Elliot Laratonda***, CSP, a safety manager at Virginia Tech Transportation Institute.

"It's a very, very dangerous hazard, especially if the equipment being used is not rated for the edge," says Shook. "I have seen testing done where the lanyard hit the edge and it sliced right through it. There is an extreme amount of force that is put on that lifeline or that connecting device when it hits that edge."

Indiana Constructors Inc. notes that leading edges can also be created by activities such as excavations. "Devastating impact injuries occur from falling into excavation holes, especially if the worker lands on an object, such as a concrete pipe or concrete forms."

Craig Firl of Capital Safety, now part of ***3M Fall Protection***, says leading edges pose unique hazards. These include:

- Increased fall distance: Workers attached at foot level (because higher anchors are not available) will fall farther.
- Lock-up speed: Self-retracting lifelines attached at foot level may not reach lock-up speed quickly enough to protect a falling worker.
- Increased fall arrest forces: Longer falls mean greater impact on the body when the fall is stopped by fall protection equipment.
- Increased potential for swinging: Workers may not fall straight down, but may swing side to side over the leading edge after falling.

In developing standards for safety equipment for leading edge applications, ANSI studied the effectiveness of self-retracting devices.

"Through their testing and analysis, ANSI confirmed a number of assumptions, including the fact that products not specifically designed for foot level tie-off—the type of anchoring most often used in these applications—will generate forces far exceeding accepted safety parameters in the event of a fall," ***says Firl***.

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OSHA Guardrail Requirements for Leading Edges

According to OSHA's construction fall protection standard (***29 CFR 1926.501***), any worker constructing a leading edge 6 feet or more above a lower level "must be protected by guardrail systems, safety net systems, or personal fall arrest systems." The only exception is when the employer can show that using those methods is either infeasible or creates a greater hazard. If that is the case, the employer must have an appropriate fall protection plan.

Similarly, in general industry (***29 CFR 1910.28, Duty to have fall protection and falling object protection***), workers must be protected when they are on a working-walking surface with an unprotected edge or side that is 4 feet or more over a lower level. As in the construction standard, employers can use guardrails, safety nets or personal fall arrest systems, and there's an exemption when these systems are infeasible.

When might these methods not work? CPWR says guardrails and safety nets often don't work on leading edges because the work zone moves as new construction is completed. In addition, safety nets often require 25 feet of clearance, which may be insufficient when there is a floor or deck below. Lifeline lanyards can get tangled if multiple workers attach to the same horizontal lifeline, says CPWR. In general industry, these methods may be impractical on loading docks, at a loading rack or on a teeming platform.

Workers who are near a leading edge but are not actively constructing it are still at risk of slipping and falling and must be protected by a guardrail system, safety net system or personal fall arrest system, says OSHA. Similarly, any employee at the edge of an excavation—such as a well, pit or shaft—more than 6 feet deep must be protected from falling by guardrails, fences, barricades or covers.

Requirements for leading edge safety systems are described in the construction standard's section on ***fall protection systems*** criteria and practices (***29 CFR 1926.502***).

How do you protect workers near open or leading edges?